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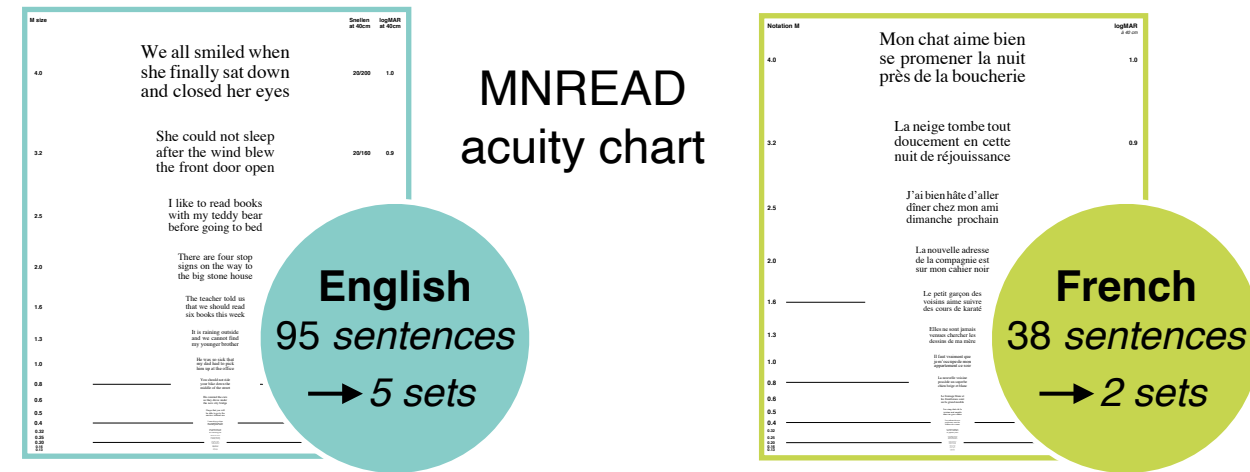
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A new method to generate automatically highly standardized reading chart text in multiple languages: the case of MNREAD

Calabrèse Aurélie¹, Bonlarron Alexandre^{2,3}, Régin Jean-Charles³, Kornprobst Pierre²

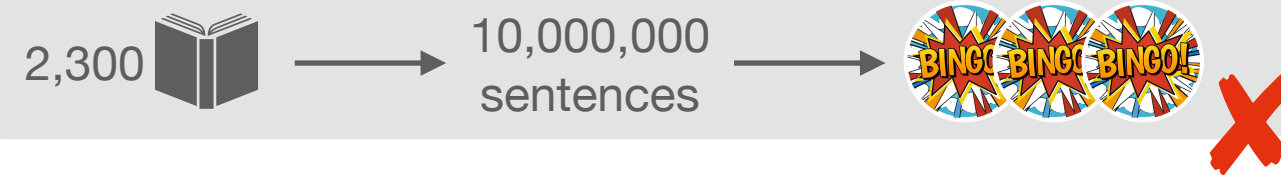
Background

- Measuring reading performance using reading charts requires highly standardized reading material.
- Such material is hard to produce and most charts are limited by their relatively small number of texts or sentences.

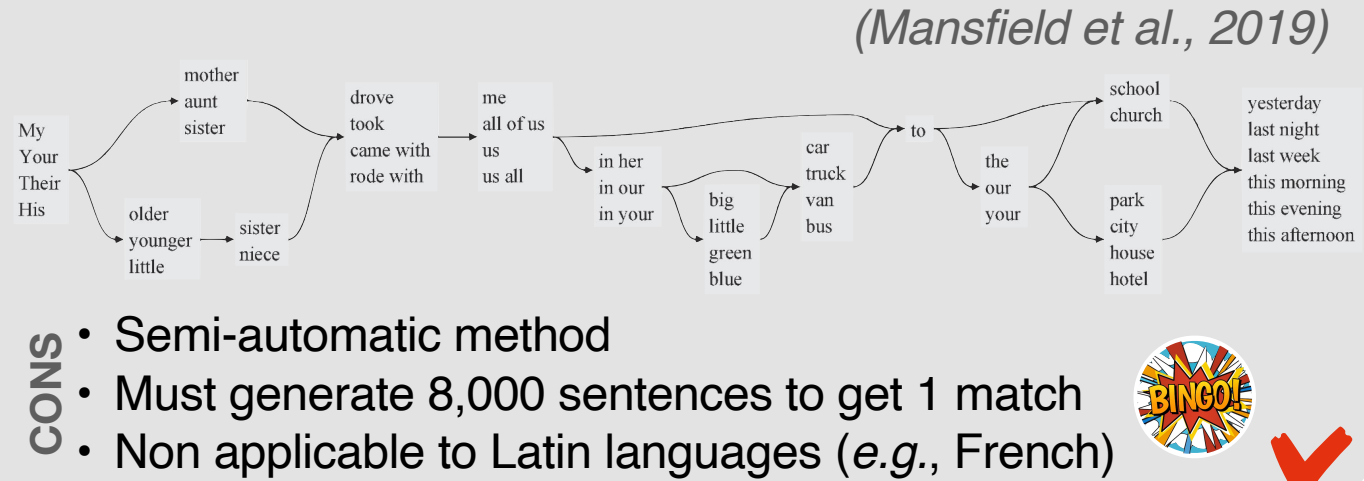


How to generate a large number of standardized sentences?

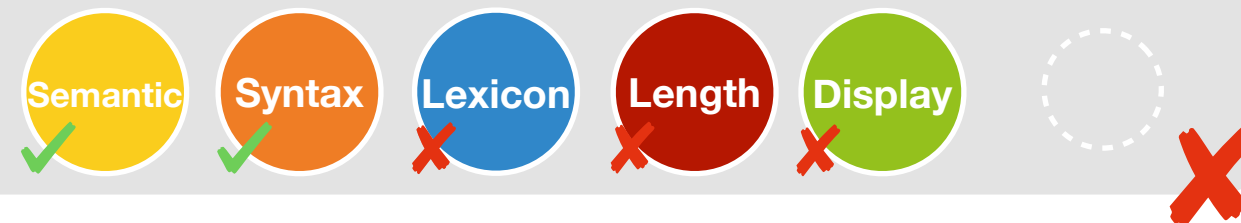
1 - Naïve method: search for MNREAD-like sentences in a corpus



2 - Ad-hoc method, based on hand-defined templates (Mansfield et al., 2019)

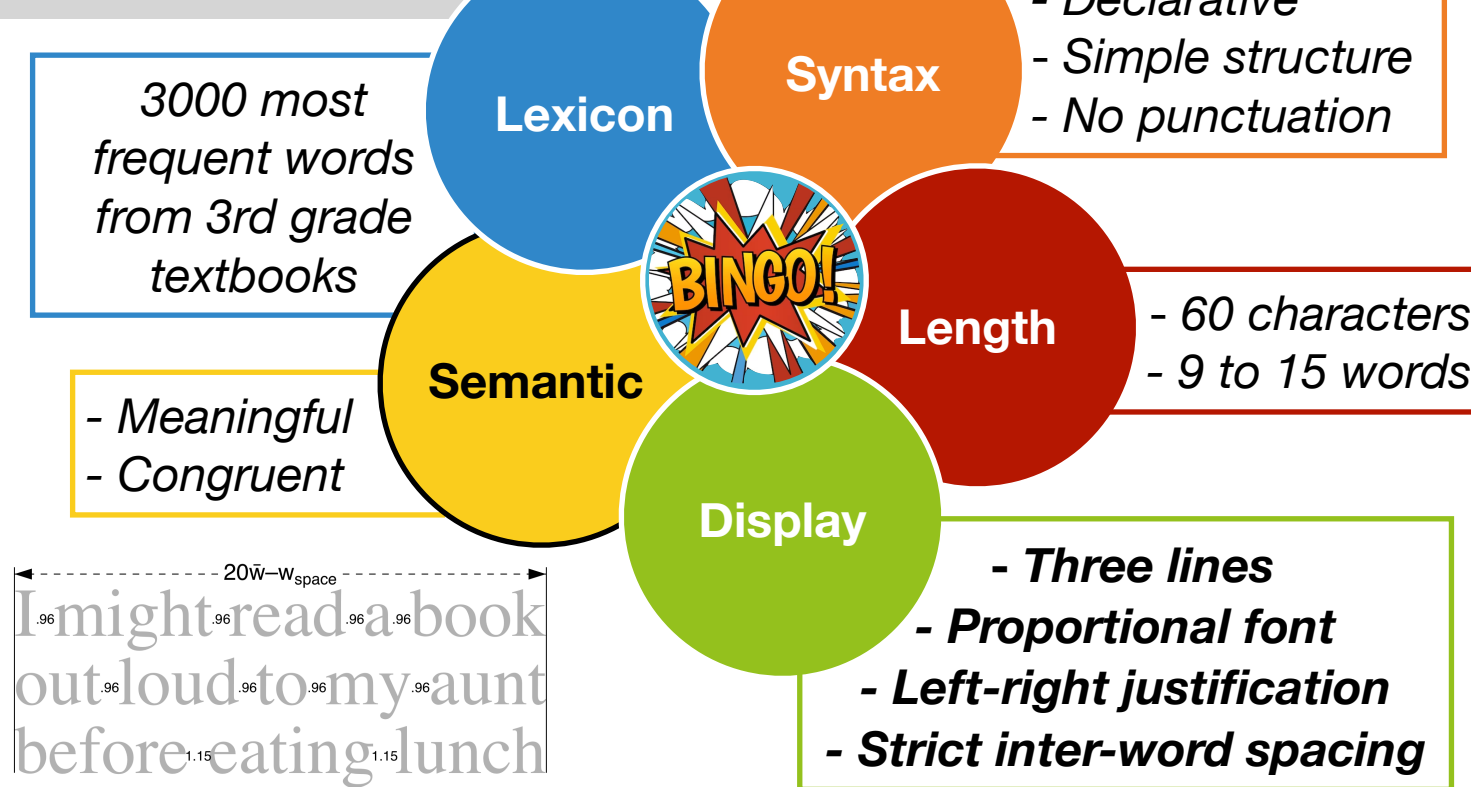


3 - Trending method... ask chatGPT

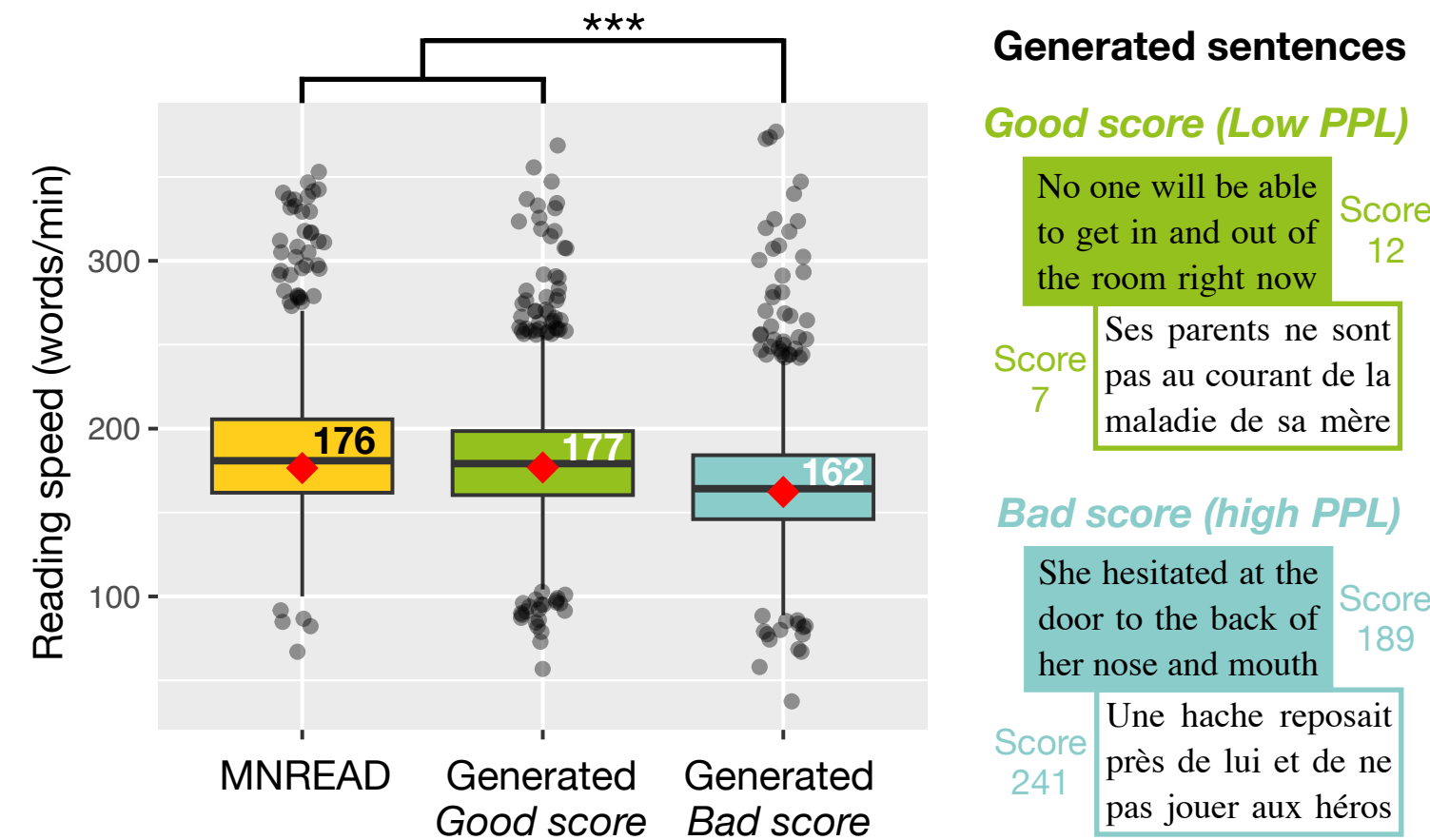


Mansfield JS, Atilgan N, Lewis AM, Legge GE. Extending the MNREAD sentence corpus: Computer-generated sentences for measuring visual performance in reading. *Vision Res.* 2019 May;158:11-18.

MNREAD rules



Results



Conclusions

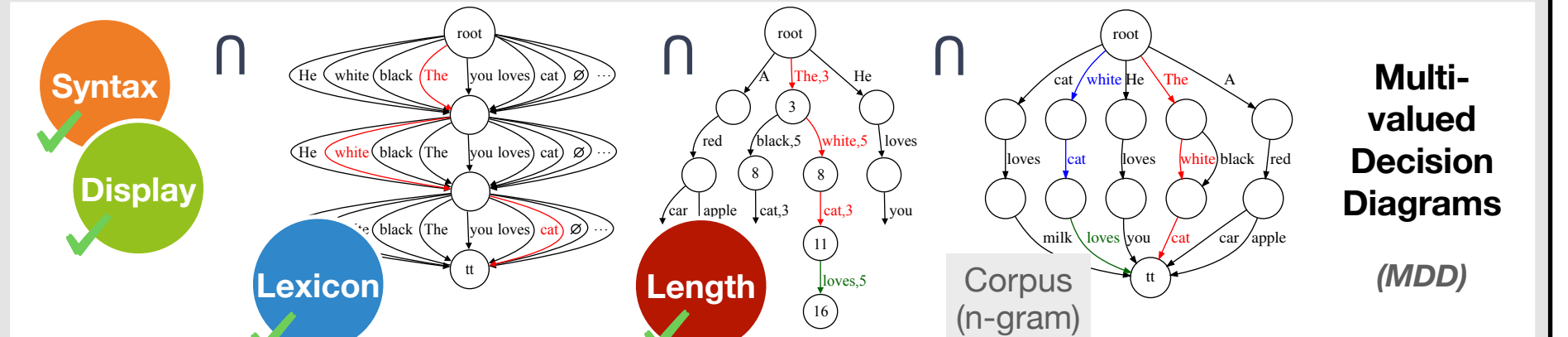
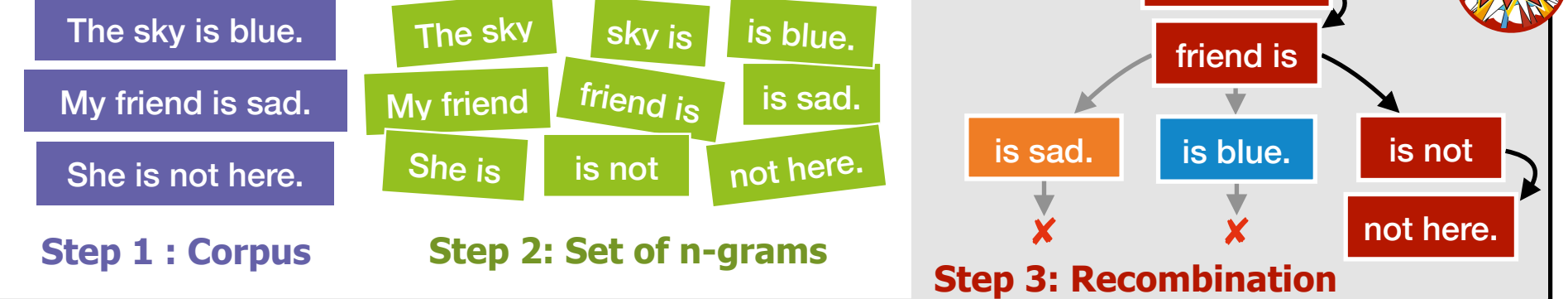
- Our method provides valid standardized sentences that follow the MNREAD rules and yield similar performance, at least in French.
- This method is flexible and allows to customise the rules easily.
- This method is applicable to other languages and remains to be validated in English, Spanish, Italian, etc.

Objective

Using the MNREAD as a proof-of-concept, we propose a new automated method to generate highly constrained short sentences, following the strict rules of MNREAD and applicable to different languages.

Methods

1- Creating the sentences



- Each MNREAD rule is modeled using a Multi-valued Decision Diagram (MDD).
- The intersection of all diagrams results in MNREAD-like sentences → 7,000 in 72 sec.

2- Scoring the sentences

- Semantic** ✓
- GPT-2 was used to assign a perplexity score (PPL) to each sentence.
- The lower the score, the most "natural" the sentence.

3- Validating the sentences

→ Normally sighted subject read French sentences at fixed print size (1.2 logMAR at 40 cm)

Experiment 1	Experiment 2	Experiment 3
N = 14	N = 24	N = 12
Mean age = 33±14	Mean age = 40±14	Mean age = 24±6
VR headset	Computer screen	Computer screen + eye tracker
38 + 30 + 30	38 + 30 + 30	38 + 100 + 100